Compost Composed Contingencies

Story and Photos by Andrew Stamer

Composting isn't a new way to get rid of organic and solid waste. It is an ancient technology and references to it date back to biblical times. The United States first recognized George Washington as its first person to compost. And, Sir Albert Howard, an agricultural scientist in India, gave composting a scientific approach nearly 75 years ago, according to Leslie R. Cooperband on the University of Wisconsin-Madison's Department of Soil Science Web site.

But a new technology to compost in contingency operations is being tested at Camp Bondsteel, Kosovo. A pilot study comparing two composting methods is being conducted by Europe District, U.S.. Army Corps of Engineers and the Deputy Chief of Staff Engineers, USAREUR and 7th Army.

"The burning of trash was actually causing a lot of problems," said Tania Smith, project manager, Europe District. "It was probably more expensive in the long run when you add up all the manpower and the fuel … but a big thing was that although they were putting the trash into a vessel and were lighting it with fuel, it wasn't getting burned because there was a lot of wet waste going into the burner."

Because the burner is not an incinerator, temperatures to burn the trash and turn it into ashes can't be reached, said Smith.

"You could actually pull out a newspaper and read it," she said.

But the big issue was the pollutants being released into the air.

"There were problems with fumes coming from this (burner) and making people sick," said Smith. This wasn't just a problem for Soldiers on post, but the locals were also complaining. This was also a problem at Camp Eagle, Bosnia, so there has been

Steam rises from open windrow compost piles during a cold and damp day at Camp Bondsteel, Kosovo.

Left: Greg Taylor, environmental specialist, Europe District, checks the temperature of compost under the Gore-Tex covered Agile system being tested at Camp Bondsteel, Kosovo.
Above: Taylor walks towards the control center of the Agile system, which is located inside the CONEX, military shipping container. Everything needed to compost waste can be shipped inside the CONEX.

a push to look for an alternative method of trash reduction.

One answer to this problem was composting because most of the material that is burned can be used as compost.

The pilot study compares the open windrow system (which is compost put into a pile and left open to the elements) to a composting system that has been designed to meet the needs for contingency operations.

"It's a pilot study to compare how effective the windrows are to the Gore-Tex cover," said Greg Taylor, environmental specialist, Europe District. "The study is pretty simple." The Gore-Tex covered system, called Agile, lays compost in a line, similar to the open windrows in shape, and both working on the principal of microbes breaking down organic matter, said Taylor.

For organic materials to be broken down, a suitable environment has to be in place.

"They need food, water, and they need air," said Taylor.

For these microbes, food is the organic material in the pile, which is bulked up with wood chips to give them the oxygen they need.

Some pretreated compost is also added to the mix to seed the new compost.

"You mix it with some old compost, some sewage sludge, the DFAC (dining facility) waste and some grass clippings … that's the old method of composting," said Taylor.

The ease in which the compost is produced with the Agile system versus the open windrows is the big difference between both methods.

Open windrows need to be aerated, so they have to be turned by hand or a machine to replenish the oxygen supply. Microbes that break down this material are disrupted when turned, which reduces the effectiveness of this composting method.

"It's labor intensive," said Taylor. "When we first make the pile we're turning them on a daily basis and adding water on a daily basis. They need constant attention and constant monitoring."

To kill pathogens, a pile needs to exceed 130 degrees Fahrenheit. And being exposed to the elements means that on cold or wet days the open windrow compost piles don't do very well, said Taylor.

The Agile system comes ready to use in a CONEX or military shipping container. The system uses Gore-Tex to cover the pile, which helps keep out the elements and regulate the temperature. It also helps hold in the needed moisture and the oxygen supply is replenished by using a computer monitoring system, which monitors heat and oxygen. When peak oxygen levels fall, a black tube under the compost pumps in air and stops when the desired level is reached, said Taylor.

Another advantage of the Gore-Tex system is that it keeps birds and other pests from digging in the heaps for food waste from the dining facility. The system also keeps the odor of the decaying organic material locked inside, while the open windrows make the area smell like a barnyard, said Taylor.

During the cold, wet winter months, the Gore-Tex system's compost piles have been keeping good temperatures (ranging from 140 degrees to 160 degrees Fahrenheit) for three weeks, while the open windrows start their decline shortly into the second week, said Taylor.

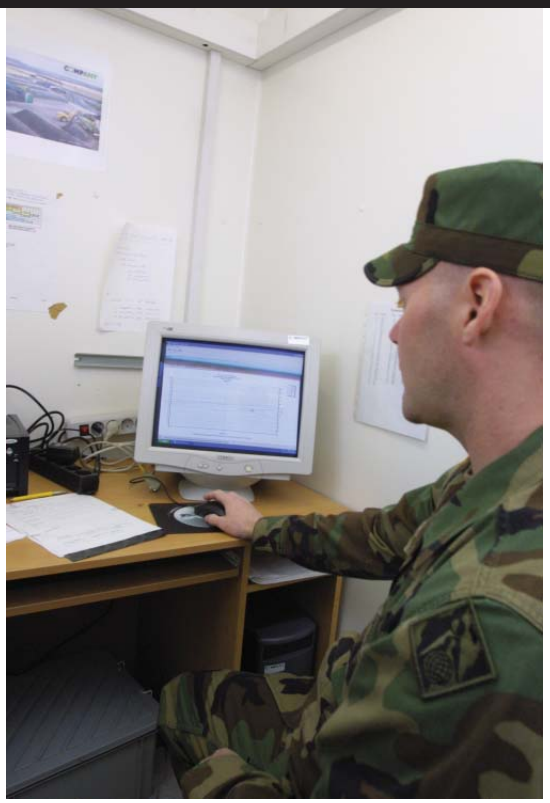
"We're looking at 21 days of sanitization and good composting under the Gore-Tex system and about 9 or 10 days under the windrows," said Taylor.

Part of the study incorporates this sanitization. Samples are taken from both composting methods and sent to England for analysis to find the true measurement of how active the microbes are, said Taylor.

The samples are tested for e. coli, fecal coli forms, Salmonella and other harmful bacteria.

There are two types of compost. Class A, which meets all of the pathogen kill and dramatic respiratory index criteria to be safe.

"You can put this stuff in your flower pots in your house



Greg Taylor, Europe District, uses a computer to monitor the Gore-Tex covered compost. The computer system can be set up to monitor the pile's condition by tracking the temperature levels and oxygen levels. Microbes that break down the organic material need oxygen to survive and when oxygen levels fall, the system can be set up to pump fresh air into the pile. Monitoring the temperature also shows how well the microbes are thriving.

Greg Taylor, Europe District, shows off the inside of the Agile compost system's CONEX. Directly in front of Taylor is the blower, which circulates fresh air into the compost when levels fall below the minimum threshold, which takes much of the work out of composting. With the open windrow system, compost piles are labor intensive because they have to be aerated by a hand or a machine, which also disrupts microbes that breakdown the material.

and not worry about it," said Taylor.

Class B compost is a little less safe because it may contain some pathogens. This type of compost shouldn't be used around places where people are going to be walking and doing a lot of activities, said Taylor.

Composting, instead of burning, may help with the camp's air quality, but the compost can also be useful as a soil amendment.

"Essentially it's going to be a fertilizer, and in this environment it's important because we have a lot of erosion issues because we have hilly terrain," said Taylor.

Above: Greg Taylor, Europe District, points out the black tubes which are used to blow fresh air into the Gore-Tex covered compost. Small holes in the tubes help air travel throughout the compost.
Below: Arsim Ymeri, hazardous waste specialist with contractor KBR and Greg Taylor, environmental specialist, mark a spot where soil needs to be tested. While the environmental office at Camp Bondsteel, Kosovo is conducting the composting test, they also test soil for contamination.

But the test may also prove the Agile system's usefulness in other operations the U.S. military is currently engaged in.

In places with sandy soil, such as Afghanistan and Iraq, it is hard to improve the soil. But adding organic matter, in the form of compost, will help water retention, and the nitrogen content will give plants, such as grass, food. The hope is that by using this system in these other contingencies it will help improve the soil conditions around helipads and cut down on the dust and debris damage, said Taylor.

Depending on how it fairs, Kosovo could be only the beginning of turning waste into a reusable product.

"Honestly, I can't imagine a better process than what we're doing right here, for getting rid of organic waste," said Taylor.

(To learn more about composting and the history of composting, visit: www.wastenot-organics.wisc.edu/composting/compostart/compostart.htm)